

A. Cover Sheet

1. Specify: ☐ agricultural project or ☒ individual application or
☒ urban project ☐ joint application
2. Proposal Title: Residential Landscape Irrigation ET Controllers Pilot Program
3. Principal Applicant: Municipal Water District of Orange County
4. Contact Name, Title: Joseph M. Berg, Water Use Efficiency Programs Manager
5. Mailing address: 10500 Ellis Avenue, P.O. Box 20895, Fountain Valley, CA 92728
6. Telephone: 714/593-5008
7. Fax: 714/964-9389
8. E-mail: jberg@mwdoc.com
9. Funds Requested: \$275,000
10. Applicant cost share funds pledged: \$416,000 cash + \$50,000 inkind = \$466,000
11. Duration: 7/2001 to 7/2002
12. State Assembly and Senate districts and Congressional district(s) where the project is to be conducted:
- | | |
|--------------------------|-----------------------------|
| State Assembly District: | 67, 68, 69, 70, 71, 72 & 73 |
| State Senate District: | 33, 34, 35, & 38 |
| Congressional District: | 39, 41, 45, 46, 47 & 48 |
13. Location and geographic boundaries of the project: Orange County and Inland Empire Utility Agency
14. Name and signature of official representing applicant. By signing below, the applicant declares the following: ___the truthfulness of all representations in the proposal; ___the individual signing the form is authorized to submit the application on behalf of the applicant; ___the applicant will comply with contract terms and conditions identified in Section 11 of this PSP.
- _____
Joseph M. Berg
(printed name of applicant)
- _____
(date)
- _____
(signature of applicant)

Residential Landscape Irrigation ET Controllers Pilot Program

Proposal

**Water Use Efficiency Program
California Department of Water Resources
U.S. Department of the Interior
CALFED Bay-Delta Program**

submitted by

The Municipal Water District of Orange County

**10500 Ellis Avenue
P.O. Box 20895
Fountain Valley, CA 92728
tel: 714/593-5008
fax: 714/964-9389
Contact: Joseph M. Berg**

in collaboration with

**Orange County Sanitation District
Orange County Water District
Inland Empire Utility Agency
Metropolitan Water District of Southern California**

Contents

A.	Cover Sheet.....	3
B.	Scope of Work	4
1.	Abstract (Executive Summary)	4
2.	Statement Of Critical Local, Regional, Bay-Delta, State and Federal Water Issues	5
3.	Nature, Scope, And Objectives of The Project	7
4.	Methods, Procedures, and Facilities	8
5.	Schedule	9
6.	Monitoring and Assessment.....	11
C.	Outreach, Community Involvement, and Information Transfer	12
1.	Outreach Efforts to Contact and Involve Disadvantaged Communities.	12
2.	Training, Employment, and Capacity Building Potential.	12
3.	Plan for Disseminating Information and Promoting Project Application.	12
4.	Letter Sent to The Local Land Use Entity, Water District, or Other Potentially Impacted or Cooperating Agencies Notifying Them of The Proposal.	12
D.	Qualifications of the Applicants, Cooperators, and Establishment of Partnerships	13
1.	Two-Page Resume(s) of Project Manager(s).....	Error! Bookmark not defined.
2.	Role of External Cooperators.....	15
3.	Partnerships Developed to Implement the Project.	15
E.	Costs and Benefits.....	16
1.	Budget Summary And Breakdown	16
2.	Budget Justification.....	18
3.	Benefit Summary and Breakdown	18
4.	Assessment of Costs and Benefits	20

A. Cover Sheet

(see cover sheet file)

B. Scope of Work

Relevance and Importance

1. Abstract (Executive Summary)

The proposed program is designed to address the following questions:

- What are the best ways to implement ET controller technology with broadcast signals in the residential sector?
- How might ET controllers be best integrated with residential survey programs?
- What are the direct costs and water savings of such programs? How much does this technology improve the persistence of water savings from residential surveys?
- What are the changes in indirect benefits and costs?
 - Improved response to emergency curtailments—such as a temporary reduction of irrigation to levels below ET?
 - Increased agency control of distribution system demand load—scheduling irrigation run times for off-peak electricity rates
 - Reduced customer oversight and monitoring
 - Maximizes horticultural efficiency and improves landscape outcomes
 - Reduced lawn run off and decreased ocean discharge

a) Description of the Project

Implement ET Controllers with Broadcast Signal Adjustments:

- Add an ET controller component to existing residential survey programs
- ET controllers embedding breaking technology can be operated via broadcast signal by horticulture experts from a central location without effort by the customer.
- Behavior is key to landscape savings and savings persistence (training, controller adjustment, sprinkler system maintenance and adjustment, choice of crop palate); ET controllers remove variability in water savings induced by behavioral factors.
- Controllers can be adjusted to water at night, and can adjust throughout the year based on seasonal pattern and recent climate conditions.
- The broadcast signal can be used to turn off irrigation on rainy days.
- Residential surveys are already known implementation mechanisms for conservation to reach the residential sector. ET controllers can improve overall cost-effectiveness of residential surveys and may form the basis for expanding BMP 1 or by creating a new ET controller BMP.

b) Methods

Summarize attempts to implement ET controller technology in residential sector, and landscape irrigation savings from residential survey programs.

- ET Controller Study (in Orange County)
- Residential survey evaluations with landscape component.

Design the addition to current survey procedures that will include ET controllers

- Create several promising alternative program designs:
 - direct install at the time of the survey
 - give out timers during the survey
 - assess savings potential during survey and distribute controller later
- Test the program designs' acceptance by customers using the alternative program designs

Implement pilot program

- Implement the ET Controller program for one year as a supplement to the existing residential survey program.
- Evaluate the costs and effectiveness of the program.

c) Objectives

Contribute to CalFed, state, regional, and local conservation goals by:

- Implementing ET controller conservation program
- Adding to, and disseminating, knowledge of the magnitude and character of the problem
- Developing most effective implementation program designs and testing them
- Characterizing applicability of the results to other regions in California
- Provide experience and defensible facts needed to consider adopting ET controllers as a BMP under the MOU Regarding Urban Water Conservation in California.
- Reduce demand for water imported from the Bay-Delta ecosystem
- Reduce urban runoff from residential landscape irrigation
- Conserve water at residential landscape sites by implementing a new technology to adjust irrigation controllers via broadcast signal
- Determine an effective program design to implement the irrigation controllers
- Evaluate the conservation savings and costs from regional, local agency and retail customer perspectives
- Evaluate implementation successes and failures and, in so doing, improve design of future programs

2. Statement Of Critical Local, Regional, Bay-Delta, State and Federal Water Issues

a) Why is this project needed?

Residential landscape conservation poses special challenges:

- Historically, there has been a low level of investment in landscape conservation because of the difficulty in achieving and measuring quantifiable and reliable savings. This project proposes to implement a pilot program with a technology that provides a greater level of confidence in savings.
- Efficient landscape irrigation needs seasonal adjustments, which requires the knowledge and time that consumers may not attend to.
- Landscape water use is a large share of residential water use, offering large savings potential.
- Landscape water needs are seasonal and correlated with water supply climate and seasonal patterns (Summer high, winter low, temperature correlation; rainfall inverse correlation).
- Runoff from landscape irrigation is a major source of water contaminants to surface waters and sewer systems—efficient irrigation practices can reduce runoff.
- Runoff is also important to shallow aquifers where groundwater is under the influence of surface water.
- Landscape irrigation needs associated with energy demand peaks (diurnal and seasonal variation)
- Southern California, including Orange County and the Inland Empire rely substantially on imported water—including the water imported from the Bay-Delta ecosystem.
- This program could be used as a model to reduce such runoff at the existing and fast-growing urban areas—including those in the Bay-Delta water system.
- Although the ET Controller Study did measure savings, it covered only a small sample of sites and did not focus on the implementation mechanisms for a wider program. There has been little experience with assessing alternative delivery mechanisms for ET Controller technology that relies on broadcast adjustment.

b) Who wants it and why?

- Conservation policy makers are interested because this study can form part of the defensible basis for creating a new BMP for ET controllers (moving from PBMP).
- Consumer demand is high for attractive landscaping, and well-managed landscape contributes to real estate value.
- Convenience, reduction of hassle costs from irrigation system, and reduced customer bills expected to be major selling points with retail customers.
- The CALFED Bay-Delta Program and associated agencies should find attractive the potential for reduction in export demand for Bay-Delta supply and the potential for reduced runoff if the technology was implemented in Bay-Delta ecosystem.

c) How is this project consistent with local and regional resource management plans?

- MWDSC Integrated Resources Plan. This plan seeks to put conservation measures on equal footing with supply measures to meet the region's water needs. This can only be defensible if reliable and measurable savings can be determined.

- Urban Water Management Plans. Residential landscape conservation is an important potential savings category in most urban water plans. ET controllers can be an important method of achieving potential savings, including peak savings, as we learn more about the implementation practicalities.
- MOU and BMPs. This program generally contributes to the MOU conservation objectives. It is an example of a technological development that provides great potential for developing Potential Best Management Practices 2 and 3. It may also be the basis for modifying BMP 1 – Residential Water Surveys.
- Runoff control plans. Water quality agencies working to control non-point source contaminants should find landscape management a contributing factor.
- Both the Orange County and Inland Empire groundwater basin management plans would be supported by efficient landscape irrigation, which reduces contaminants in sewer inflows and reduces demand for low TDS blending water (OC).

3. Nature, Scope, And Objectives of The Project

a) Nature of the Project

ET controllers present special opportunities:

- New technology ET controllers can be operated by broadcast signal by horticulture expert from central location, without effort by consumer
- Behavior is key to landscape savings and savings persistence (training, controller adjustment, sprinkler system maintenance and adjustment, choice of crop palate); ET controllers reduce need for one of these behavioral variables.
- Controllers can be adjusted to water at night, and can adjust throughout the year based on seasonal pattern and recent climate conditions.
- The broadcast signal can be used to turn off irrigation when it rains.
- Residential surveys are already known implementation mechanisms for conservation—to reach the residential sector. Their overall cost-effectiveness can be improved with ET Controllers.

b) Scope

- Orange County and Inland Empire Utility Agency service areas.
- Residential survey of 3,000 customers, adding the ET controller component.
- Both single-family and multi-family sectors.

c) Objectives

Contribute to CALFED, state, regional, and local conservation goals by:

- Implementing ET controller conservation program
- Adding to, and disseminating, knowledge of the magnitude and character of the problem
- Developing most effective implementation program designs and testing them
- Characterizing applicability of the results to other regions in California

- Evaluation of moving ET controllers from Potential BMP to BMP status— independent assessment of potential is important.
- Reduce demand for water imported from the Bay-Delta ecosystem.
- Reduce electrical demand for import-related pumping and distribution system electricity demand management.
- Reduce urban runoff from landscape irrigation by controlling irrigation more effectively.
- Conserve water at residential landscape sites by implementing a new technology to adjust irrigation controllers via broadcast signal.

Technical/Scientific Merit, Feasibility, Monitoring, and Assessment

4. Methods, Procedures, and Facilities

Task 1: Summarize Attempts to Implement ET Controllers with Broadcast Signal Adjustment.

We will summarize previous program examples and the technology that they rely on. The focus will be on implementation mechanisms, savings and costs rather than on the technology and its technical details. One important source of information will be the ET Controller study nearing completion in Orange County.

Task 2: Compare Alternative Implementation Strategies and Draft Plan. Since so little implementation experience has taken place, the project needs to thoughtfully address the question of how to best implement the program.

- Design the ET controller program to add on to current residential survey programs
- Create several promising alternative program designs. For example:
 - direct install at the time of the survey
 - give out timers during the survey
 - assess savings potential during survey and distribute controllers to most cost-effective sites
- Test the program designs' acceptance by customers

Task 3: Implement Pilot Program. Much of the implementation of the program will be the same as for previous residential surveys, although current strategy should reflect the expanded outdoor component:

- Determine sites to target
- Train survey contractors
- Plan and tailor equipment deployment and coordination with equipment vendors and broadcast technology
- Test-run the combined residential survey on a small number of sites first
- Tune-up the survey strategies as needed
- Implement the controller component to all 3,000 of the planned residential surveys in the program year
- Collect site data during residential surveys

Task 4: Evaluate Pilot Program. We plan to include a substantial evaluation component in the program—to assess costs, savings, and implementation effectiveness.

- Savings Analysis. Validate savings measured in ET Controller Study—over a longer period of time and a large sample of customers with more varied characteristics. Extend knowledge base by examining additional savings issues—persistence of savings, variation in savings, and customer characteristics that identify greatest savings potential.
- Implementation Analysis. Assess alternative program designs for implementing a program with ET Controllers with residential surveys.
- Cost-Effectiveness Analysis. Confirm or reject the idea that ET controllers can improve the cost-effectiveness of residential surveys.

Task 5: Report and Dissemination.

- Draft and final report, including evaluation and program summaries.
- Web sites and water planning conferences.
- Discuss opportunities for expansion and applicability to other service areas.

Task 6: Coordination and Administration

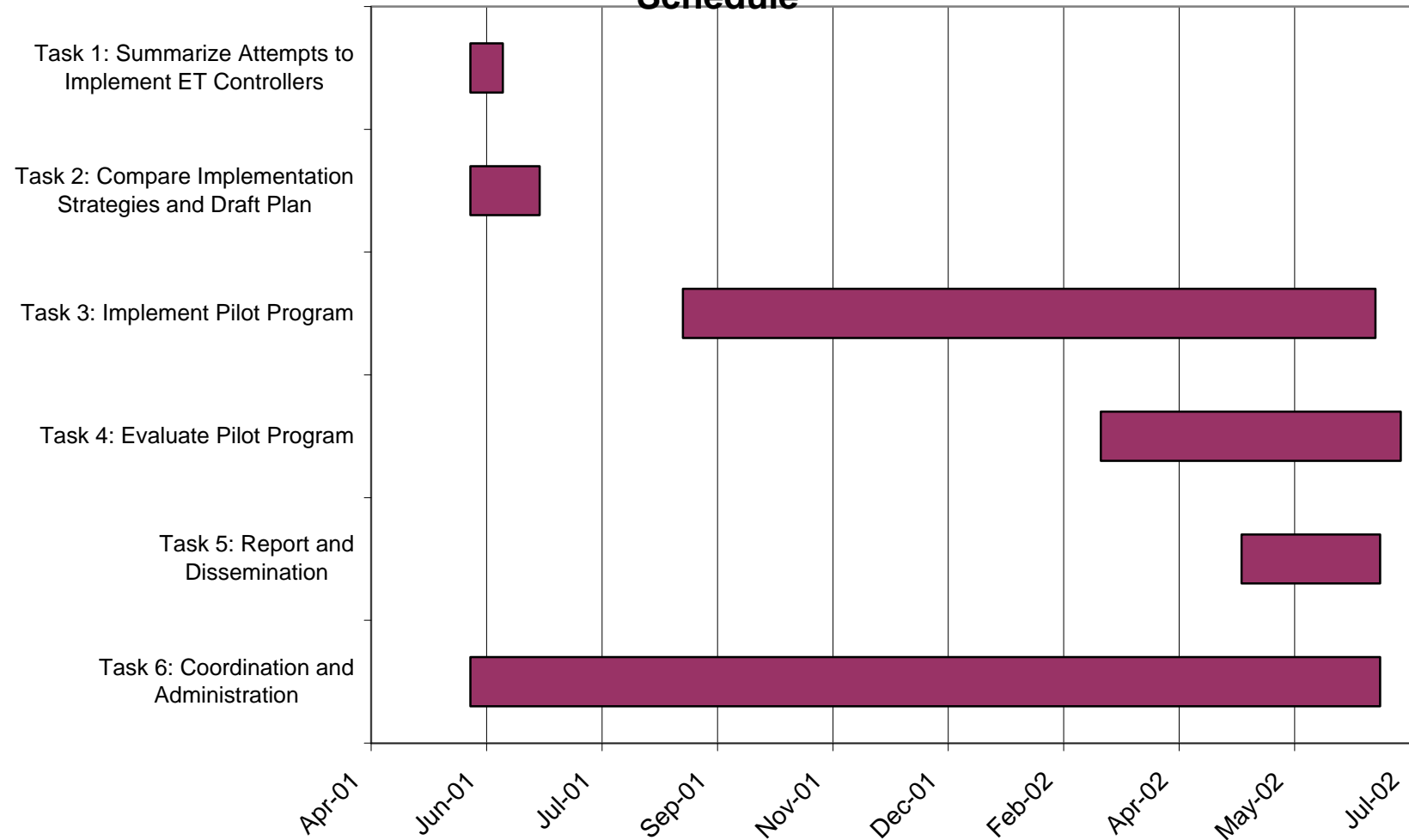
5. Schedule

Task	Start Date	Duration (Days)	End Date
Task 1: Summarize Attempts to Implement ET Controllers	1-Jul-2001	14	14-Jul-01
Task 2: Compare Implementation Strategies and Draft Plan	1-Jul-2001	30	30-Jul-01
Task 3: Implement Pilot Program	1-Oct-2001	300	27-Jul-02
Task 4: Evaluate Pilot Program	1-Apr-2002	130	8-Aug-02
Task 5: Report and Dissemination	1-Jun-2002	60	30-Jul-02
Task 6: Coordination and Administration	1-Jul-2001	394	29-Jul-02

Quarterly Expenditure Projection

	Q1	Q2	Q3	Q4	Q5	Total
Percent	35.0%	30.0%	15.0%	10.0%	10.0%	100.0%
Total	\$ 259,352	\$ 222,302	\$ 111,151	\$ 74,101	\$ 74,101	\$ 741,005
Grant	\$ 96,250	\$ 82,500	\$ 41,250	\$ 27,500	\$ 27,500	\$ 275,000

Schedule



6. Monitoring and Assessment

- Include a substantial evaluation component in the program—to assess costs and savings.
- Data from surveys is compiled in a database; for this project additional data will be collected regarding the ET controllers.
- Data on the controller adjustments is maintained in the central station.
- Cost data is maintained by implementing agency.
- Savings can be assessed with billing histories which are already maintained at the retail agencies.
- A summary report and data will be available at the end of the evaluation.

C. Outreach, Community Involvement, and Information Transfer

1. Outreach Efforts to Contact and Involve Disadvantaged Communities.

The program will test target multi-family sites with low-income residents and consider ways to reduce water costs to low-income residents.

2. Training, Employment, and Capacity Building Potential.

Most of the training, employment, and capacity building potential of this project is from the implementation contractor that conducts the surveys. In addition, there will need to be landscape contractor training, which may be implemented through existing programs.

3. Plan for Disseminating Information and Promoting Project Application.

- Final report
- MWDOC web site
- AWWA conferences
- CUWCC committees
- Agency boards of directors
- Press releases

4. Letter Sent to The Local Land Use Entity, Water District, or Other Potentially Impacted or Cooperating Agencies Notifying Them of The Proposal.

No letter has been sent due to no anticipated negative impacts to associated agencies.

D. Qualifications of the Applicants, Cooperators, and Establishment of Partnerships

Joseph M. Berg

17 Mira Segura
Rancho Santa Margarita, CA 92688
949-766-0971
josephmberg@home.com

KEY QUALIFICATIONS:

- Proven ability to develop multi-jurisdictional programs and funding partnerships
- Extensive knowledge of all sectors of urban water planning and protection
- Strong public speaking experience to local, regional, state and international governments
- Demonstrated ability to inspire, motivate, and lead within a team environment
- Established project development and management experience
- Window 2000, Microsoft Office, Microsoft Internet Explorer, Netscape proficient

EXPERIENCE:

- | | |
|----------------|--|
| 1/98 – present | <p>Municipal Water District of Orange County, Fountain Valley, CA
Title: Water Use Efficiency Programs Manager Phone: 714-593-5008</p> <ul style="list-style-type: none">• Developed and planned demand side management programs valued at more than \$6 million annually for the Orange County region• Provided team leadership for 2000 Regional Urban Water Management Plan of Orange County• Planned and directed all hiring and staffing for the agency and consultants providing professional services• Demonstrated county and state leadership in advancing water management, conservation, and environmental policy• Submitted reports to meet state and federal compliance• Prepared and maintained departmental budget• Identify market opportunities for development of expanded programs |
| 3/95 – 1/98 | <p>Municipal Water District of Orange County, Fountain Valley, CA
Title: Water Use Efficiency Programs Supervisor</p> <ul style="list-style-type: none">• Expanded grant proposal funding to \$4 million annually• Forged new partnerships with local, regional and state elected officials• Presented water conservation and environmental concerns to all branches of State government, advocating a collaborative |

approach to policy design, program assessment and implementation

7/93 – 3/95

Municipal Water District of Orange County, Fountain Valley, CA

Title: **Conservation Coordinator**

- Acquired \$3 million in private and public funding grants to off-set public cost of water program implementation
- Produced 1995 Regional Urban Water Management Plan for Orange County including demand estimate, identification of water supply options, conservation activities, and water shortage contingency plan as required by State regulation

11/91 – 7/93

Municipal Water District of Orange County, Fountain Valley, CA

Title: **Public Affairs Assistant**

- Acquired \$2 million in private and public funding grants to off-set public cost of water program implementation
- Developed and implemented public and retail agency water conservation programs
- Conducted public relation campaign designed to promote awareness of residential conservation and environmental programs

2/91 – 11/91

San Diego County Water Authority, San Diego, CA

Title: **Water Conservation Intern**

- Gained general knowledge of broad based water programs
- Developed educational program to inform customer about conservation strategies and opportunities
- Planned and managed quality control of ultra low-flush toilet program

EDUCATION:

9/88 – 6/91

San Diego State University, San Diego, CA

9/85 – 6/88

Major: Bachelor of Arts, Resource and Environmental Geography

Saddleback Community College, Mission Viejo, CA

Major: Associate of Arts, General Education

ACTIVITIES:

May 2000

Guest Speaker, Balleric Island, Spain – Environmental Water Conf.

2000

- Topic - Innovative Partnerships for Water Conservation

Convener, California Urban Water Conservation Council

- Developed a three year strategic plan

1/99 – present

Vice Chair, Santa Margarita WD Community Advisory Board

- Initiated more consumer involvement in advisory board

1/98 – present

Board Member, Norte Vista Maintenance Corporation

5. Role of External Cooperators

The role of the external cooperators will consist of the following:

- Project direction and oversight
- Funding support
- Site location (ET controller installations at other sites)
- Assessment of project costs and benefits from different agency perspectives: groundwater, wastewater, reclamation, wholesale and retail water supply. Identify cost-effective opportunities for cooperation on additional programs where mutually beneficial.
- Assessment of implementation barriers and opportunities at different agency perspectives.

6. Partnerships Developed to Implement the Project.

a) Orange County Sanitation District.

OCSD has been a long standing collaborator with MWDOC in the development of water conservation programs. OCSD has particular interest in this project because of its potential benefits in terms of sewer flow contamination reduction.

b) Orange County Water District

As the manager of Orange County's groundwater basin, OCWD is interested in the project because of its ability to reduce demand for low TDS groundwater by reducing demand.

c) Inland Empire Utility Agency

By providing an alternative test site, the IEUA adds important breadth to the project coverage. IEUA has high TDS groundwater. It is moving aggressively to make useful its very large potential capacity for groundwater storage, which is 500,000 AF in short development and 1 million AF capacity in the longer term development.

d) Metropolitan Water District of Southern California

As the major regional wholesaler water importer, MWDSC is the essential link between the Orange County and Inland Empire service areas and the Bay-Delta ecosystem in Northern California. Reduction and management of demand allows MWDSC to better serve its member agencies with reliable and high quality supply. MWDSC has a history of supporting landscape conservation programs and has show interest in assisting the development of conserving technologies, bringing them to the field, and assessing their quantifiable and reliability yield as well as cost.

e) Retail Agencies Throughout Orange County and Inland Empire Service Areas

Individual agencies throughout the service areas will participate in a variety of roles depending on their particular interest in the program and service area characteristics. Agencies with sizable residential landscape water have the greatest economic interest.

D. Costs and Benefits

1. Budget Summary And Breakdown

(See next page)

Budget: Residential Landscape Irrigation ET Controllers Pilot Program

Task	MWD OC		Collaborating Agencies		Evaluation		Total	
	Hours	\$75/hr.	Hours	\$75/hr.	Hours	\$100/hr.	Hours	\$/Task
Task 1: Summarize Attempts to Implement ET Controllers	20	\$ 1,500	20	\$ 1,500	40	\$ 4,000	80	\$ 7,000
Task 2: Compare Implementation Strategies and Draft Plan	45	\$ 3,375	45	\$ 3,375	100	\$ 10,000	190	\$ 16,750
Task 3: Implement Pilot Program	120	\$ 9,000	120	\$ 9,000	30	\$ 3,000	270	\$ 21,000
Task 4: Evaluate Pilot Program	10	\$ 750	10	\$ 750	370	\$ 37,000	390	\$ 38,500
Task 5: Report and Dissemination	60	\$ 4,500	32	\$ 2,400	120	\$ 12,000	212	\$ 18,900
Task 6: Coordination and Administration	80	\$ 6,000	80	\$ 6,000	80	\$ 8,000	240	\$ 20,000
Total	335	\$ 25,125	307	\$ 23,025	740	\$ 74,000	1,382	\$ 122,150

Direct Labor Cost	\$ 25,125	\$ 23,025	\$ 74,000	\$ 122,150
Fringe Benefits	included	included	included	included
Overhead (at 1.7)	\$ 42,713	\$ 39,143	included	\$ 81,855
Local Travel and Transportation	\$ 500	\$ 500	\$ 1,000	\$ 2,000
Survey Costs	\$ 142,500	\$ 142,500	\$ -	\$ 285,000
Controller Costs	\$ 125,000	\$ 125,000	\$ -	\$ 250,000
Total Participant Costs	\$ 335,838	\$ 330,168	\$ 75,000	\$ 741,005
In-Kind	\$ 22,000	\$ 22,000	\$ 6,000	\$ 50,000
Cash	\$ 313,838	\$ 308,168	\$ 69,000	\$ 691,005
Total Project Cost	\$ 741,005			
In-Kind Contributions	\$ 50,000			
Participant Cash Contributions	\$ 416,005			
Requested Grant Funding	\$ 275,000			

2. Budget Justification

Labor hours on the part of the lead agency and collaborating agencies cover all of the tasks in the project to a partial or full extent. The program development and implementation will require considerable staff time to complete because this type of program has not been implemented on this scale previously.

The survey costs include \$95 per survey for 3,000 surveys that are expected to be conducted at residential sites. ET Controllers cost approximately \$200 each. If installed directly, there is an additional \$100 cost to the agency.

The evaluation budget includes resources for program assessment by a research consultant.

3. Benefit Summary and Breakdown

a) Quantified Project Outcomes And Benefits

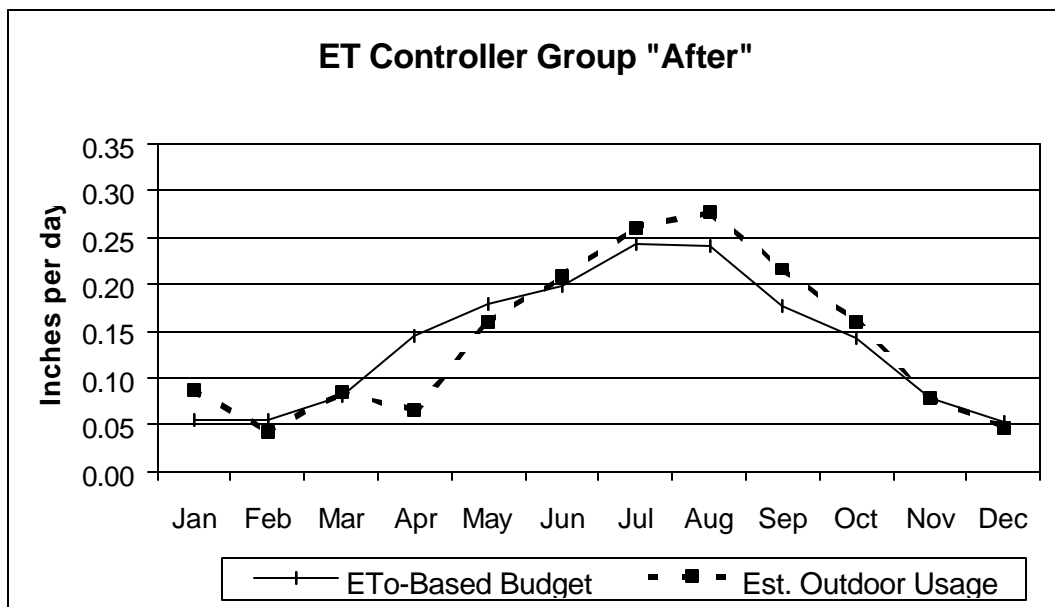
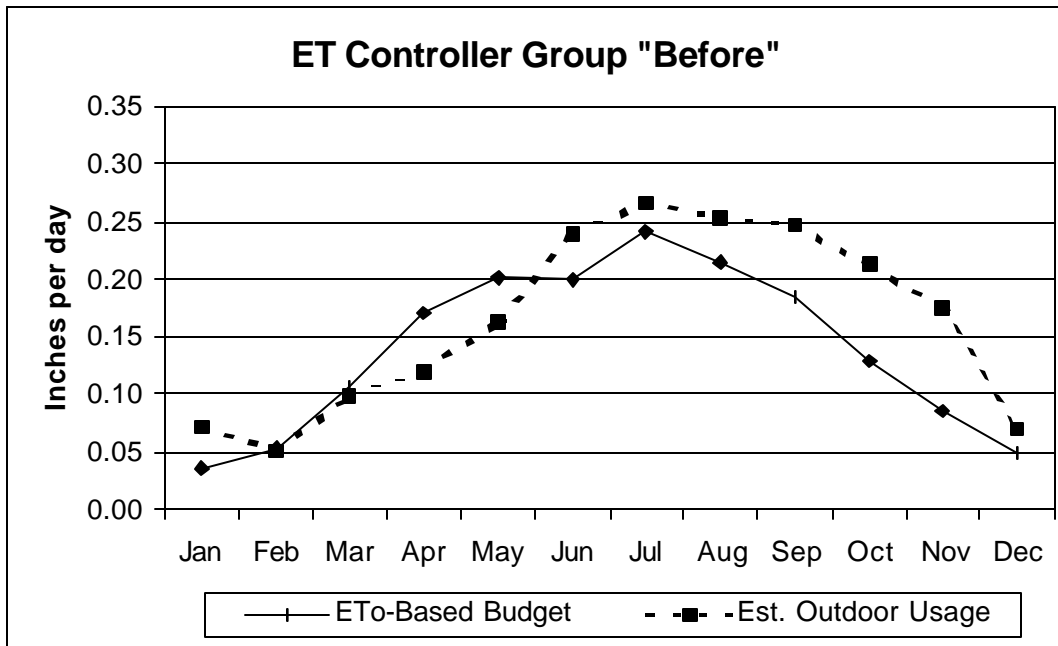
- Water savings, both in total consumption and seasonal profile of demand.

Table 1 Estimated Savings

Group	Normalized base use per household (gallons/day)	Average landscape per household (acres)	Reduction in total water use¹ (percent)	Total savings per household (gallons/day)	Outdoor water use as proportion of total² (percent)	Reduction in outdoor water use (percent)
Control	535.25	0.041	≈0.00	≈0.00	42.75	≈0.00
Postcard	561.12	0.042	5.16	28.95	45.32	11.38
Treatment	533.51	0.051	7.01	37.40	42.76	16.39

NOTES: ¹Model derived estimates, of which only the postcard and treatment group savings are statistically significant (Appendix A). ²Outdoor water use is derived as the positive difference between normalized use and IRWD's indoor allocation (the proportion is based only on pre-intervention reads).

Source: Preliminary results taken from *DRAFT* 'Residential Weather-Based Irrigation Scheduling: Evidence from the Irvine "ET Controller" Study'



Source: Preliminary results taken from *DRAFT* 'Residential Weather-Based Irrigation Scheduling: Evidence from the Irvine "ET Controller" Study'

b) Non-Quantified Project Outcomes and Benefits

Regional and State Perspectives

- Reduced demand for water imported from Northern California
- Reduced surface runoff and contamination
- Reduced demand on groundwater resources

Water Agency Perspectives

- Reduced demand for water imported from Northern California

Wastewater Agency Perspectives

- Reduced TDS load into system
- Managed demand for reclaimed water

Groundwater Agency Perspectives

- Reduced demand on groundwater resources

Customer Perspectives

- Reduced water cost (on average)
- Healthier landscape
- Improved real estate values

4. Assessment of Costs and Benefits

The following table is a simple cost benefit analysis using the following assumptions:

- 6% discount rate
- 37.4 gallons per day savings (ET Controller Study)
- \$300 for controller and installation full cost
- 15 year life span
- \$750/AF in benefits, increasing at 2% (real) per year to reflect real increases in the cost of marginal water supply

Cost Benefit Analysis (\$2000)									
Retail									
Year	Costs	Savings AFY	Benefits (\$/AF)	Retail Benefits (\$)	PV Costs	PV Benefits	Annual NPV	Annual NPV	Annual NPV
0	\$ 300	0.04	\$ 750	\$ 31.44	\$ 300	\$ 31	\$ (269)	\$ (269)	\$ (269)
1	\$ -	0.04	\$ 765	\$ 32.07	\$ -	\$ 30	\$ 30	\$ (238)	\$ (238)
2	\$ -	0.04	\$ 780	\$ 32.71	\$ -	\$ 29	\$ 29	\$ (209)	\$ (209)
3	\$ -	0.04	\$ 796	\$ 33.37	\$ -	\$ 28	\$ 28	\$ (181)	\$ (181)
4	\$ -	0.04	\$ 812	\$ 34.03	\$ -	\$ 27	\$ 27	\$ (154)	\$ (154)
5	\$ -	0.04	\$ 828	\$ 34.71	\$ -	\$ 26	\$ 26	\$ (128)	\$ (128)
6	\$ -	0.04	\$ 845	\$ 35.41	\$ -	\$ 25	\$ 25	\$ (103)	\$ (103)
7	\$ -	0.04	\$ 862	\$ 36.12	\$ -	\$ 24	\$ 24	\$ (79)	\$ (79)
8	\$ -	0.04	\$ 879	\$ 36.84	\$ -	\$ 23	\$ 23	\$ (56)	\$ (56)
9	\$ -	0.04	\$ 896	\$ 37.58	\$ -	\$ 22	\$ 22	\$ (34)	\$ (34)
10	\$ -	0.04	\$ 914	\$ 38.33	\$ -	\$ 21	\$ 21	\$ (13)	\$ (13)
11	\$ -	0.04	\$ 933	\$ 39.09	\$ -	\$ 21	\$ 21	\$ 8	\$ 8
12	\$ -	0.04	\$ 951	\$ 39.88	\$ -	\$ 20	\$ 20	\$ 28	\$ 28
13	\$ -	0.04	\$ 970	\$ 40.67	\$ -	\$ 19	\$ 19	\$ 47	\$ 47
14	\$ -	0.04	\$ 990	\$ 41.49	\$ -	\$ 18	\$ 18	\$ 65	\$ 65
15	\$ -	0.04	\$ 1,009	\$ 42.32	\$ -	\$ 18	\$ 18	\$ 83	\$ 83

a) Summary Table of Costs and Benefits by Beneficiary

Benefits

Regional and State Perspectives

- Reduced demand for water imported from Northern California
- Reduced surface runoff and contamination
- Reduced demand on groundwater resources

Water Agency Perspectives

- Reduced demand for imported water

Wastewater Agency Perspectives

- Reduced TDS load into system
- Managed demand for reclaimed water

Groundwater Agency Perspectives

- Reduced demand on groundwater resources

Customer Perspectives

- Reduced water cost
- Healthier landscape
- Improved real estate values

Costs

Regional and State Perspectives

- Cost share of controllers and share of survey component

Water Agency Perspectives

- Cost share of controllers and share of survey component

Wastewater Agency Perspectives

- Cost share of controllers and share of survey component

Groundwater Agency Perspectives

- Cost share of controllers and share of survey component

Customer Perspectives

- Cost share of controllers and share of survey component